

## Three new species of the genus *Gammarus* from tributaries of the Ili River, China (Crustacea, Amphipoda, Gammaridae)

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### Three new species of the genus *Gammarus* from tributaries of the Ili River, China (Crustacea, Amphipoda, Gammaridae).

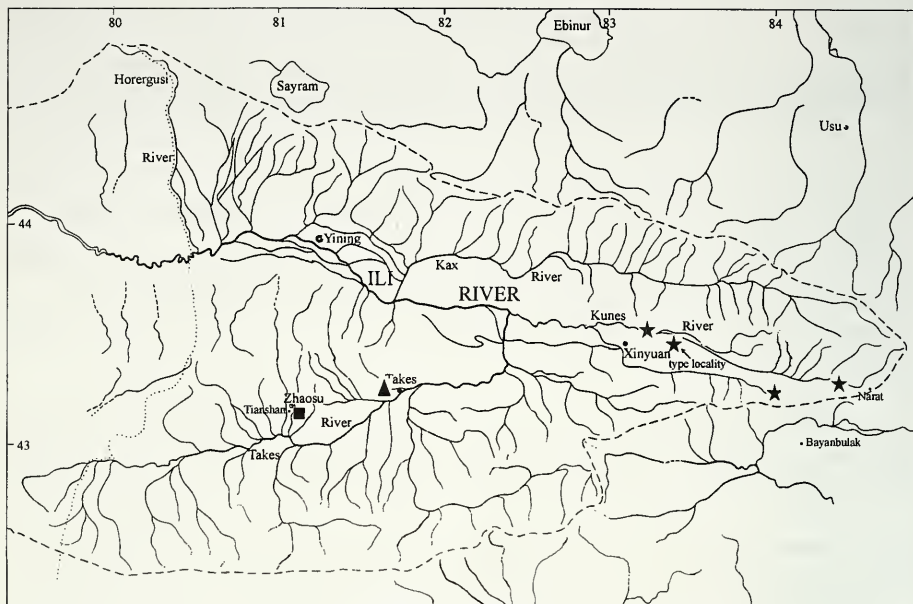
- Three new species of the genus *Gammarus* are described on the base of specimens collected from Ili River, Xinjiang, China. *Gammarus montanus* sp. n. is characterized by uropod 3 armed with long simple setae and antenna 2 lacking calceoli; *G. brevipodus* sp. n. is distinguished by the peduncle of antenna 2 with long setae along both margins and inner ramus of uropod 3 about one-third of outer ramus. *G. takesensis* sp. n. differs from *G. brevipodus* sp. n. by inner ramus of uropod 3 reaching three-fourths of outer ramus. Distribution data on these gammarids are also presented.

**Key-words:** Amphipoda - *Gammarus* - taxonomy - Ili River - China.

## INTRODUCTION

The Ili River, also called “Yili” or “Ile” River, runs through parts of China and Kazakhstan. This river is 950 km long, rising from Mt Tianshan (NW Xinjiang of China) and flowing west across the China-Kazakhstan border, through the sandy Sary-Ishik-Otrau Desert, into Lake Balkhash. In its upper reaches the Ili is a mountain river; in the Balkhash plane it is a valley river. Before running into Lake Balkhash, it forms a delta of about 9000 km<sup>2</sup>. Ili is famous for its beauty and attracts more and more visitors every year. In the course of an invertebrate survey of Mt. Tianshan, a collection trip along the Chinese part of the Ili River was made by Dr Zhixiao Liu and students from Xinjiang University in July and August 2001. When checking this collection, we found three new gammarids, which are described in the present paper. The relationship between the new species and other related gammarids is discussed and their known distribution is presented (Map 1).

*Gammarus* is one of the largest genera of epigeic freshwater amphipods. Barnard & Barnard (1983) reviewed the freshwater Amphipoda worldwide and 117 species were listed under the genus *Gammarus*. After 1983, more than 20 species have



MAP 1. Localities of freshwater amphipods along the Chinese part of Ili River. Square = *Gammarus montanus* sp. n., triangle = *G. takesensis* sp. n., star = *G. brevipodus* sp. n.

been reported by several authors (Karaman & Pinkster, 1987; Barnard & Dai, 1988; Morino & Whitman, 1995; Stock *et al.*, 1998; Hou & Li, 2002a, b, c, 2003a, b, c, d; Hou, Li & Koenemann, 2002; Hou, Li & Morino, 2002; Hou, Li & Zheng, 2002; Meng, Hou & Li, 2003). According to the study by Karaman and Pinkster (1977a, b, 1987), these species can be subdivided into three artificial species groups, as shown in the key below. In the present paper, *Gammarus montanus* sp. n. belongs to the *G. pulex*-group, while *G. brevipodus* sp. n. and *G. takesensis* sp. n. belong to the *G. balcanicus*-group.

#### KEY TO SPECIES-GROUPS IN THE GENUS *GAMMARUS*

- 1 Metasome segments with middorsal process (carina) . . . . . *G. roeseli*-group
- Metasome segments without middorsal process . . . . . 2
- 2 Pereopods 3 and 4 and uropod 3 bearing numerous long setae . *G. pulex*-group
- Pereopods 3 and 4 and uropod 3 poorly setose . . . . . *G. balcanicus*-group

#### MATERIAL AND METHODS

Specimens were collected by a net and then preserved in 75% alcohol. For each species three to five specimens of each sex were dissected and appendages were mounted on slides according to the methods described by Holsinger (1967). The drawings were made with the aid of a drawing tube mounted on an Olympus BX-41 compound microscope.

All holotypes treated in this study are deposited in the Institute of Zoology, Chinese Academy of Sciences (IZCAS), Beijing, China. Paratypes are deposited in the Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS), and in the Muséum d'histoire naturelle, Geneva (MHNG).

## DESCRIPTIONS

### *Gammarus montanus* sp. n.

Figs 1-5

*Material*: holotype, male (IZCAS-I-A0053), Tianshan Town, Zhaosu County (43.1°N, 81.1°E), collected by Dr Zhixiao Liu and Mr Ayiheng, August 12, 2001. Paratypes: 20 males, 20 females and 10 juveniles (IZCAS), 9 males and 9 females (MHNG), same data as for the holotype.

*Etymology*: the species name “*montanus*” refers to the habitat of this new species.

*Diagnosis*: *Gammarus montanus* sp. n. belongs to *Gammarus pulex*-group and is characterized by uropod 3 armed with long simple setae and by antenna 2 lacking calceoli.

*Description of male*: body 10.2 mm in length.

Head: eyes ovate, inferior antennal sinus deep (Fig. 1A).

Antenna 1 (Fig. 4A): peduncular articles 1-3 in length ratio 1 : 0.59 : 0.41, with slender setae distally; primary flagellum twenty-eight articulate, most articles with aesthetascs, accessory flagellum four articulate.

Antenna 2 (Fig. 4B): peduncular article 4 about as long as article 5, both with two to three groups of setae along anterior and posterior margins; flagellum ten articulate, calceoli lacking.

Upper lip convex, with minute setules (Fig. 1G).

Mandibles (Figs 1I, K): left incisor with five teeth, lacinia mobilis with four dentitions, molar with one long plumose seta; article 2 of palp with thirteen long stiff slender setae on medial margin, article 3 reaching 83% length of article 2, bearing two groups of long B-setae on medial surface, three long A-setae on lateral surface, a row of eighteen short plumose D-setae and four long E-setae. Right incisor with four teeth, lacinia mobilis bifurcate, molar with one long plumose seta.

Lower lip (Fig. 1H): inner lobe absent.

Maxilla 1 asymmetrical (Figs 1J, L): medial margin of inner plate bearing several slender setules basally, and fifteen plumose setae evenly distributed between the base and apex; outer plate sparsely setose medially, the apex bearing eleven serrate robust setae; palp two articulate, the left second article falcate, bearing eight naked robust setae apically accompanied by three stiff setules apico-facially; the right second article bearing five broad-based tooth setae and two stiff slender setae.

Maxilla 2 (Fig. 1F): inner plate with an oblique row of thirteen plumose setae on medial surface, evenly distributed between the base and apex; outer plate with stiff setae apically.

Maxilliped (Fig. 1M): inner plate bearing one subapical and three apical blade-like tooth setae, associated with plumose setae on medial and apical margins; outer plate bearing sixteen blade-like robust setae on medial margin and eight apical pectinate setae; palp four articulate.

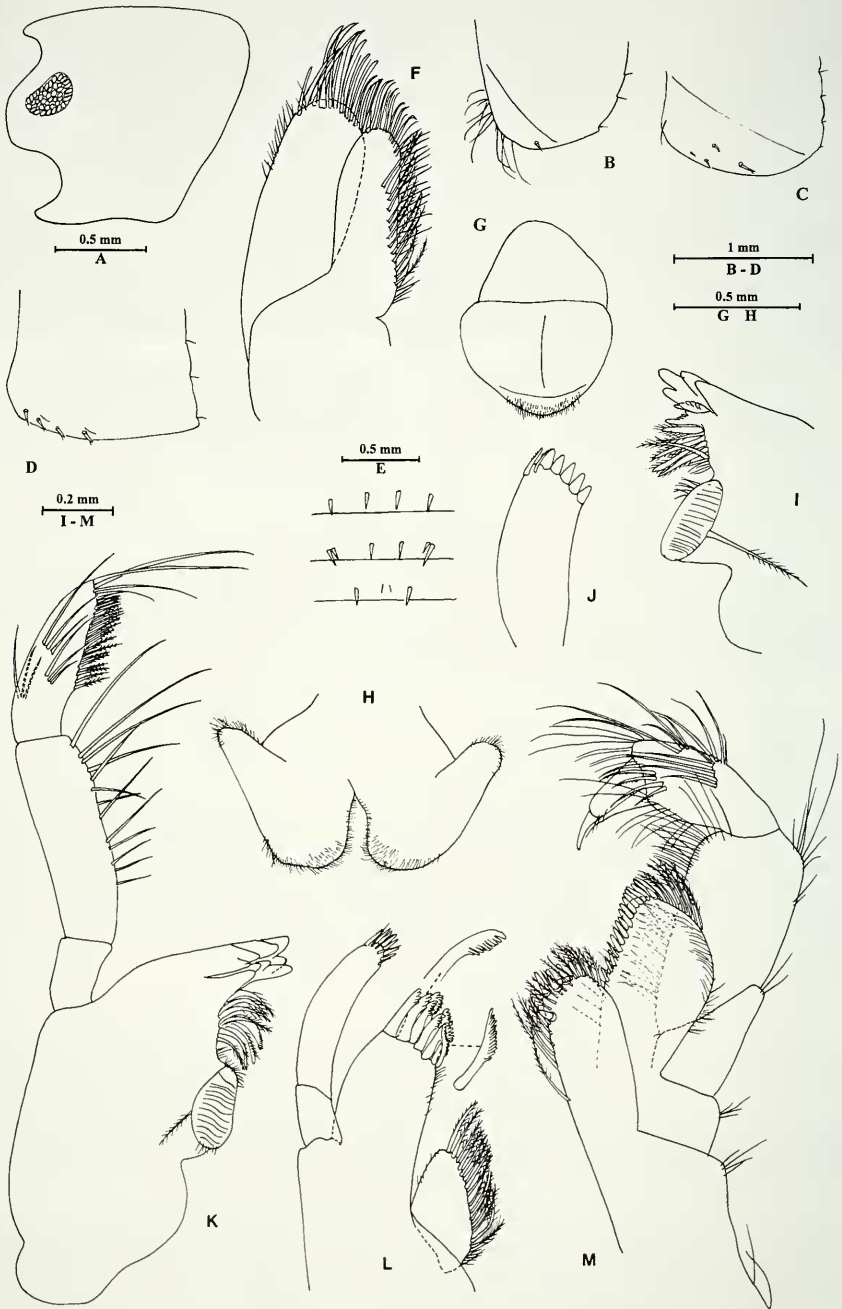


FIG. 1. *Gammarus montanus* sp. n., holotype, male. A, head; B, epimeral plate 1; C, epimeral plate 2; D, epimeral plate 3; E, urosomites (dorsal view); F, maxilla 2; G, upper lip; H, lower lip; I, right mandible; J, palp of right maxilla 1; K, left mandible; L, left maxilla 1; M, maxilliped.



FIG. 2. *Gammarus montanus* sp. n. holotype, male. A, propodus and dactylus of gnathopod 1; B, propodus and dactylus of gnathopod 2; C, gnathopod 2; D, gnathopod 1.

Coxal plates: coxal plates 1-3 subrectangular (Figs 2C, D, 3E), bearing two to three setules on anterior corner and one setule on posterior corner; coxal plate 4 excavate (Fig. 3A), bearing two setules on anterior corner and six setules on posterior margin; anterior lobe of coxal plates 5 and 6 small (Figs 3B, C), posterior lobe with two setules on posterodistal corners; coxal plate 7 (Fig. 3D) with six setules on posterior margin.

Coxal gills: coxal gills present on pereopods 2-7, sac-like.

Gnathopod 1 (Figs 2A, D): basis with long naked setae along lateroproximal and medial margins, four plumose setae on posterodistal corner; carpus reaching 73% length of propodus, bearing two groups of long setae on lateral margin, and a row of long slender setae on medial margin; palm of propodus strongly oblique, bearing one palmar medial robust seta, ten robust setae on lateral margin and six robust setae on medial surface, associated with groups of long naked setae on medial surface; dactylus with one long naked seta on lateral margin.

Gnathopod 2 (Figs 2B, C) larger than gnathopod 1, basis similar to that of gnathopod 1; carpus reaching 75% length of propodus, bearing one group of long naked setae on lateral margin and a row of long setae on medial margin; propodus subrectangular, bearing one blunt palmar medial robust seta, two robust setae on medial posterodistal corner and two robust setae on lateral posterodistal corner, with eight groups of long setae on medial surface; dactylus with one naked seta on lateral margin.

Pereopod 3 (Figs 3E, F) longer than pereopod 4, basis with fourteen slender setae on medial margin, three groups of long setae and three groups of short setae on lateral margin; merus to propodus densely with long setae on medial margins; carpus and propodus accompanied by small robust setae; dactylus with one plumose seta on lateral margin and two stiff setae at hinge of nail.

Pereopod 4 (Figs 3A, G): subequal to pereopod 3, medial margins of merus and carpus with less long straight setae than pereopod 3.

Pereopod 5 (Figs 3B, H): basis nearly straight on medial margin, bearing four short robust seta on lateral margin and a row of eight setules on medial margin; merus bearing three groups of slender setae on lateral margin; carpus with two and three groups of short robust seta along medial and lateral margins; dactylus with 1 plumose seta on lateral margin.

Pereopod 6 (Figs 3C, I): basis weakly concave posteriorly, bearing a group of posterodistal setae on medial surface; merus to propodus bearing two or three groups of robust setae on lateral margins; dactylus with one seta on lateral margin and one stiff seta at hinge of nail.

Pereopod 7 (Figs 3D, J): similar to pereopod 6, basis weakly expanded posteriorly, with one group of posterodistal setae on medial surface.

Epimeral plates: epimeral plates 1-3 bearing three to four short setules on medial margins. Epimeral plate 1 (Fig. 1B) with thirteen long setae on anteroventral corner and one robust seta on medial-ventral margin; epimeral plates 2 and 3 slightly pointed on posterodistal corners (Figs 1C, D), with three robust setae and two setae on ventral margin of plate 2 and four robust setae on ventral margin of plate 3.

Pleopods: pleopods 1-3 subequal in length (Figs 4F-H), peduncle bearing two retinacula accompanied by two setae on anterodistal corner and some long setae on

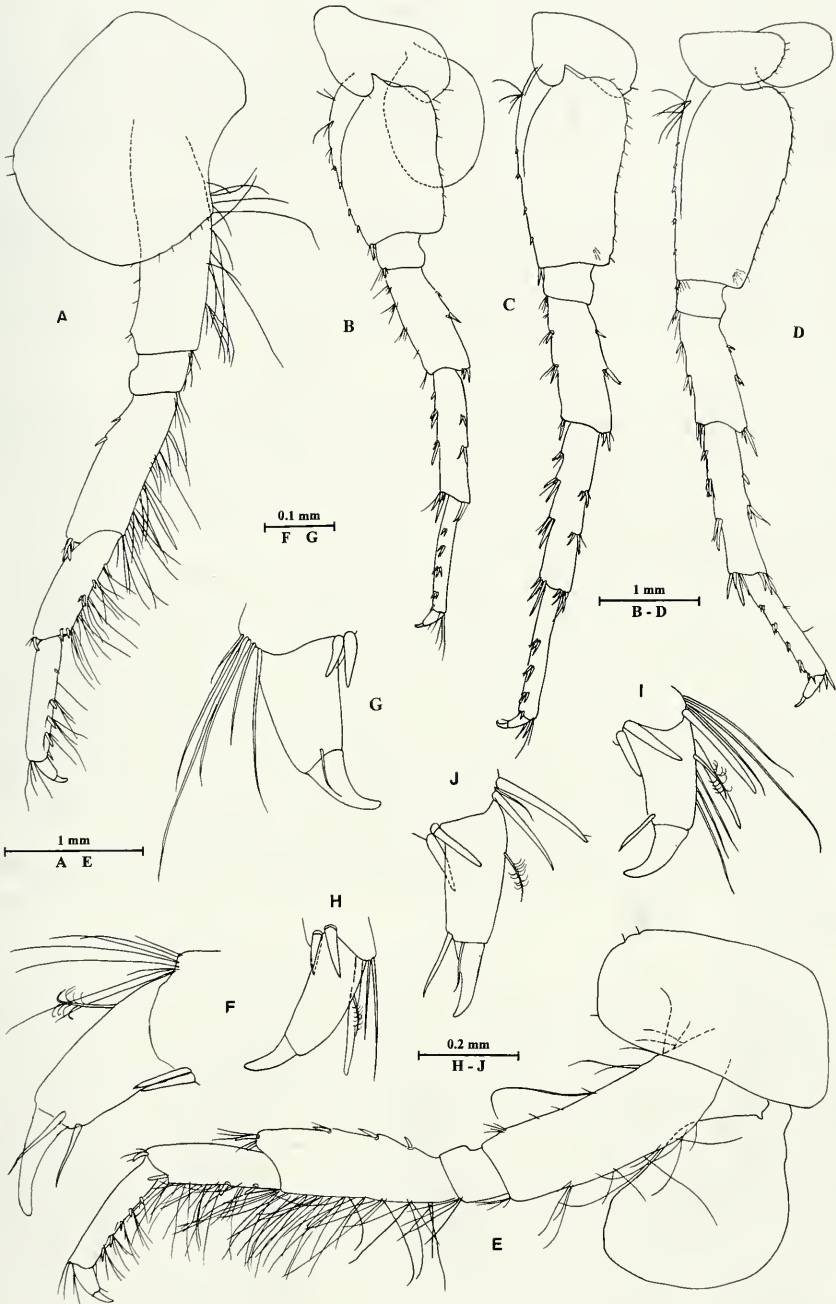


FIG. 3. *Gammarus montanus* sp. n., holotype, male. A, pereopod 4; B, pereopod 5; C, pereopod 6; D, pereopod 7; E, pereopod 3; F, dactylus of pereopod 3; G, dactylus of pereopod 4; H, dactylus of pereopod 5; I, dactylus of pereopod 6; J, dactylus of pereopod 7.

medial surface; both rami thirteen to eighteen articulate, armed with long plumose setae.

Urosomites: urosomites 1-3 without humps dorsally (Fig. 1E), urosomites 1-2 bearing four groups of one or two robust setae accompanied by fine setae on postero-dorsal margins; urosomite 3 with two single robust setae and two single fine setae on posterodorsal margin.

Uropod 1 (Fig. 4E): peduncle with one basofacial robust seta, three robust setae on lateral margin, one robust seta on medial margin, two robust setae on laterodistal corner and one robust seta on mediiodistal corner; outer ramus with two robust setae on medial margin and two robust setae on lateral margin; inner ramus with one robust seta on lateral margin and two robust setae on medial margin; both rami with five apical robust setae.

Uropod 2 (Fig. 4D): peduncle longer than both rami, bearing three slender robust setae on lateral margin, one robust seta on medial margin and one distal robust seta on medial and lateral corners; outer ramus a little shorter than inner ramus, bearing one robust seta on medial margin and one robust seta on lateral margin; inner ramus bearing two robust setae on medial margin and one robust seta on lateral margin; both rami bearing five apical robust setae.

Uropod 3 (Fig. 4I): peduncle short, bearing a pair of submarginal robust setae mid-laterally, one robust seta apico-laterally, two robust setae apico-medially, and two robust setae and a seta on the mid-vontrodistal margin; inner ramus short, about 47% length of outer ramus, bearing medially ten long simple setae, without lateral setae, the apex bearing one robust seta accompanied by five long setae; outer ramus two articulate, the second article tiny, about one twentieth the length of the first, and subequal to the three robust apical setae of that article, the second article bearing four long apical setae; the medial margin of the first article with groups of long simple setae, the lateral margin with four robust setae associated with many long simple setae.

Telson (Fig. 4C) cleft to basis, each lobe with two or three distal robust setae accompanied by two to four long slender setae, and with two groups of setae on dorsal surface.

*Description of female:* length 7.5 mm. Propodus of gnathopod 1 ovate (Fig. 5B), palm not oblique as in male, bearing eight robust setae on posterior margin accompanied by many long setae, and seven groups of setae on medial surface; nail of dactylus elongate, bearing one seta on lateral margin. Propodus of gnathopod 2 subrectangular (Fig. 5A), bearing two robust setae on posteromedial corner and two robust setae on posterolateral corner. Uropod 3 similar to that of male, inner ramus reaching 45% length of article 1 of outer ramus, both rami armed with long simple setae (Fig. 5C). Telson cleft to the basis (Fig. 5E), each lobe with three distal robust setae and one basolateral robust seta. Oostegites of pereopods 2-5 present (Fig. 5D).

*Remarks:* *Gammarus montanus* sp. n. bears characters in common with *G. gregoryi* Tattersall, 1924 and *G. paucispinus* Hou & Li, 2002b particularly in the presence of simple setae on both margins of uropod 3, and in the shape of the epimeral plates 1-3. *G. montanus* sp. n. can be distinguished from *G. gregoryi* by the absence of calceoli and the inner ramus of uropod 3 which is about half as long as article 1 of the



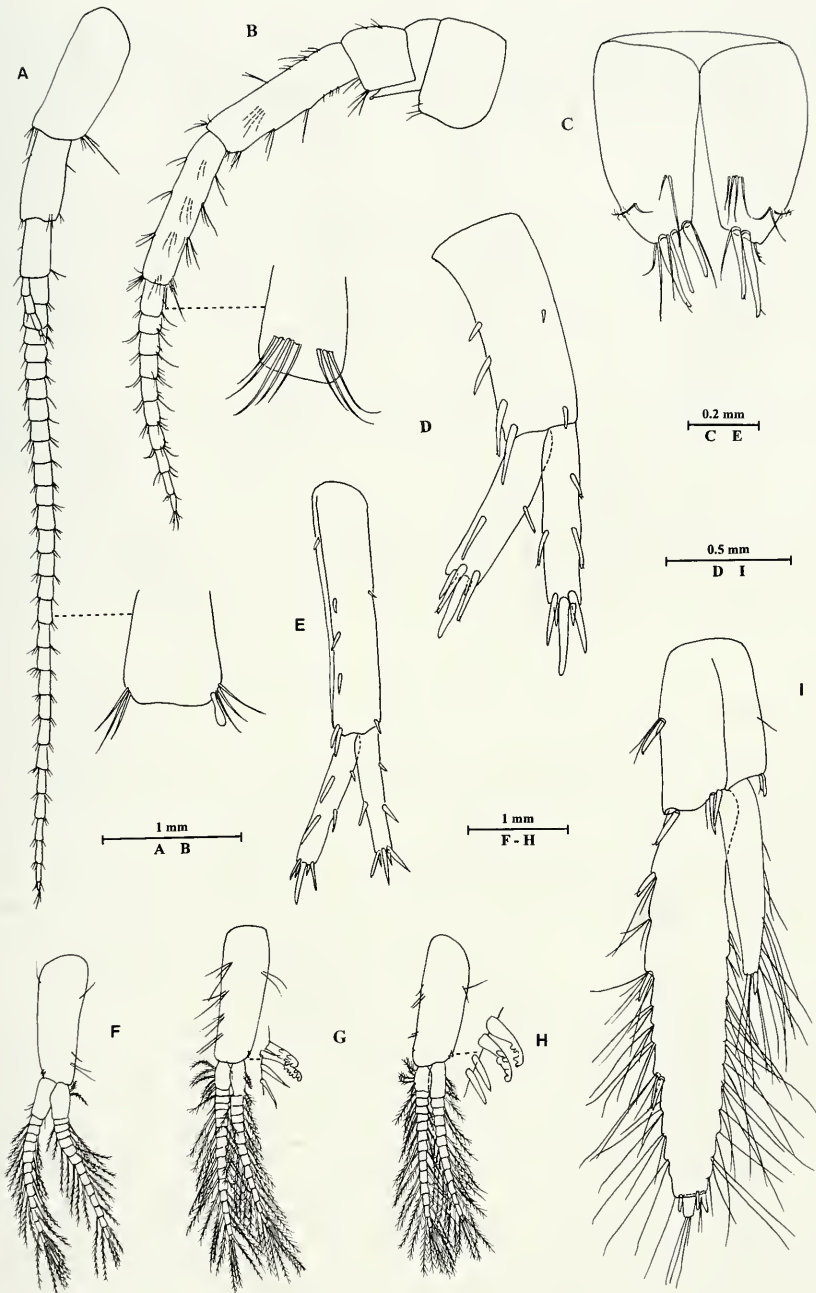


FIG. 4. *Gammarus montanus* sp. n., holotype, male. A, antenna 1; B, antenna 2; C, telson; D, uropod 2; E, uropod 1; F, pleopod 1; G, pleopod 2; H, pleopod 3; I, uropod 3.

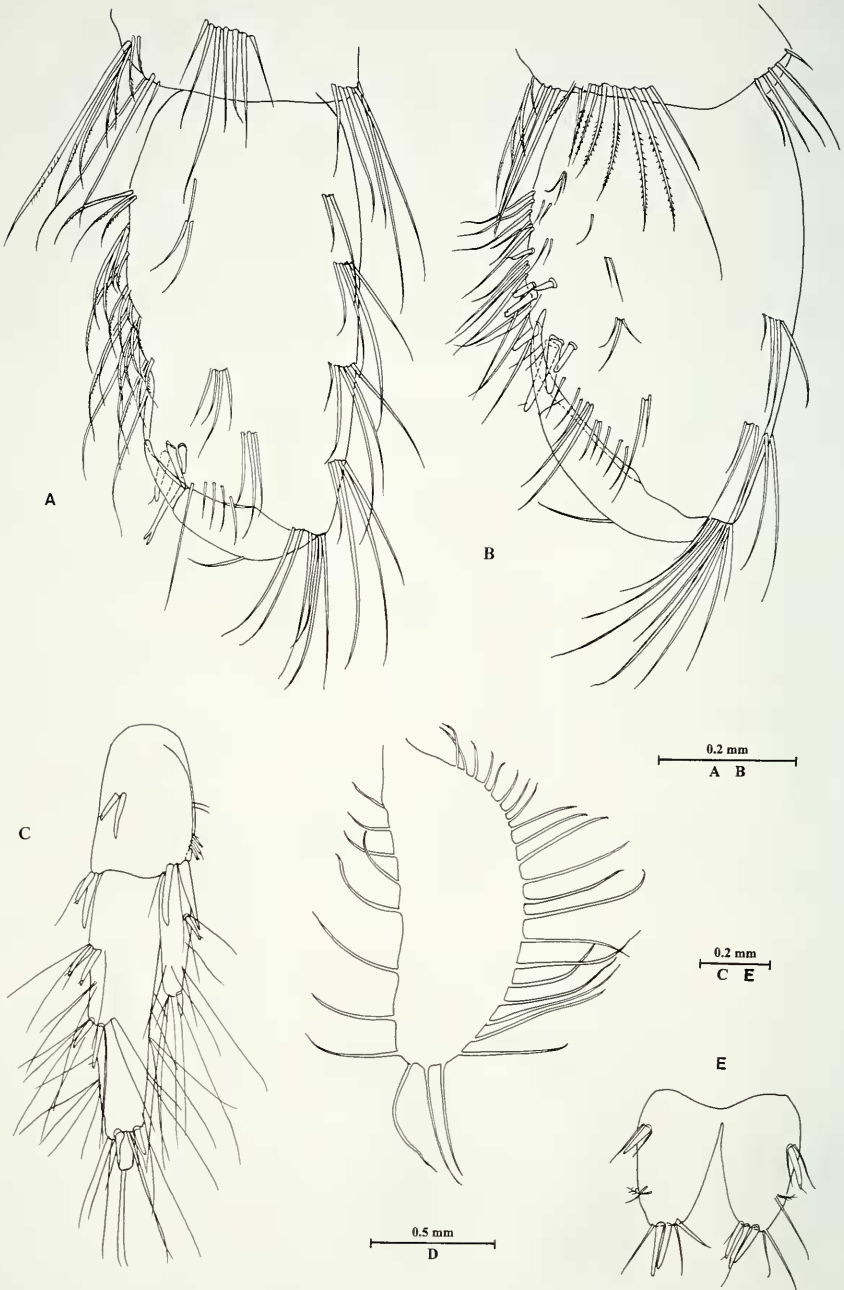


FIG. 5. *Gammarus montanus* sp. n., female. A, propodus and dactylus of gnathopod 2; B, propodus and dactylus of gnathopod 1; C, uropod 3; D, oostegite 2; E, telson.

outer ramus (about one-third in *G. gregoryi*). *G. montanus* sp. n. differs from *G. paucispinus* in that urosomite 1 bears four singly arranged robust setae on the dorsal margin (urosome 1 only with a few setae in *G. paucispinus*), and the telson bears few long setae on the dorsal margin (telson with groups of long setae on dorsal margin in *G. paucispinus*).

***Gammarus brevipodus* sp. n.**

Figs 6-10

*Material*: holotype, male (IZCAS-I-A0055), from a feeder stream of the Ili River at the crossroad of National Highway 217 and 218, Xinyuan County (43.25°N, 83.16°E), collected by Dr Zhixiao Liu and Mr Ayiheng, August 16, 2001. Paratypes: 14 males and 5 females (IZCAS), same data as for the holotype; 10 males and 10 females (MHNG), Kunes River, Narat Town (43.2°N, 84.6°E), Xinyuan County, collected by Dr Zhixiao Liu and Mr Ayiheng, August 15, 2001.

Other material: 20 males, 9 females and 15 juveniles, Kunes River, Narat Town, collected by Dr Zhixiao Liu and Mr Ayiheng; August 15, 2001. 25 males, 10 females and 2 juveniles, Bayanbulak (43.0°N, 84.1°E), collected by Dr Zhixiao Liu and Mr Meng Kaibayier, August 17, 2001.

*Etymology*: the epithet “*brevipodus*” refers to the short inner ramus of uropod 3.

*Diagnosis*: *Gammarus brevipodus* sp. n. belongs to the *G. balcanicus*-group. *Gammarus brevipodus* sp. n. can be distinguished by the following characters: (1) antenna 2 with long setae along both margins, (2) calceoli absent, (3) uropod 3 armed with few setae, (4) article 2 of outer ramus in uropod 3 subequal to adjacent robust setae.

*Description of male*: body length 14.5 mm.

Head (Fig. 6A): lateral cephalic lobe truncate, inferior antennal sinus deep, eyes relatively small.

Antenna 1 (Fig. 9F): peduncular articles 1-3 in length ratio 1 : 0.7 : 0.44, bearing short distal setae; primary flagellum twenty articulate, most articles with aesthetascs; accessory flagellum four articulate.

Antenna 2 (Fig. 9E): peduncular article 4 a little shorter than article 5, both articles with long setae along anterior and posterior margins; flagellum eight articulate, with some distal short setae, calceoli lacking.

Upper lip convex (Fig. 6D), with minute setules.

Mandibles (Figs 6H, I): left incisor with five teeth; lacinia mobilis with four dentitions; molar triturative, bearing one plumose seta; article 2 of palp with seventeen long stiff setae on medial margin, article 3 reaching 80% length of article 2, bearing two groups of long simple B-setae on medial surface, seven long simple A-setae on lateral surface, a row of D-setae on medial margin and four E-setae. Right incisor with four teeth, lacinia mobilis bifurcate, with several weak teeth at ridge.

Lower lip (Fig. 6C): inner lobe absent.

Maxilla 1 (Figs 6F, G): inner plate triangular, medial margin bearing several slender setules basally, and twelve plumose setae evenly distributed between the base and apex; outer plate subrectangular, sparsely setose medially, the apex bearing eleven serrate robust setae; palp 2 articulate, the left second article weakly falcate, bearing mediodistally a single short stout seta, apically 4 robust naked setae and three stiff setules apico-facilly; the right second article bearing five broad-based tooth setae and two stiff slender setae.

Maxilla 2 (Fig. 6E): inner plate with an oblique row of ten plumose setae on the medial surface, evenly distributed between the base and apex; the outer plate bearing slender setae apically.

Maxilliped (Fig. 6J): inner plate bearing one subapical and three apical robust tooth setae, associated with plumose setae on medial and apical margins; outer plate bearing thirteen blade-like robust setae on medial margin and 6 apical pectinate setae; palp 4 articulate.

Coxal plates: coxal plates 1-3 subrectangular (Figs 7A, B, 8A), with three to five short setules on anteroventral corner and one seta on posteroventral corner; coxal plate 4 excavate (Fig. 8B), with four setules on anteroventral corner, 8 setules on medial margin and some minute facial setae; anterior lobe of coxal plates 5 and 6 small (Figs 8C, D), with one or two setules on anteroventral corner, posterior margin with three or two setules; coxal plate 7 (Fig. 9A) with five setules on medial margin.

Gnathopod 1 (Figs 7A, C): basis with long setae on lateroproximal and medial margin, with four plumose setae on posterodistal corner accompanied by three long setae; carpus reaching 75% length of propodus, bearing one group of long setae on lateral margin and several groups of setae on medial margin; propodus pyriform, palm oblique, bearing one medial stout robust seta, ten robust setae on lateral margin and six robust setae on medial surface, associated with groups of long setae on medial surface; dactylus with 1 seta on lateral margin.

Gnathopod 2 (Figs 7B, D): basis similar to that of gnathopod 1; carpus reaching 86% length of propodus, with subparallel margins; propodus subrectangular, palm with one medial stout robust seta, four robust setae on lateral posterodistal corner, two robust setae on medial posterodistal corner, and seven groups of long setae on medial surface; dactylus with one seta on lateral margin.

Pereopod 3 (Figs 8A, E) slender, basis with four long setae on lateral margin and fifteen setae on medial margin; merus with two single robust setae on lateral margin and three groups of short setae on medial margin; carpus with three short robust setae accompanied by short setae on medial margin; propodus with four groups of short robust setae on medial margin; dactylus with one seta on lateral margin and two stiff setae at hinge of nail.

Pereopod 4 (Figs 8B, F): armature similar to that of pereopod 3.

Pereopod 5 (Figs 8C, G): basis nearly straight on medial margin, with five single robust setae on lateral margin and a row of twenty short setae on medial margin; merus with two groups of short setae on lateral margin; carpus with two groups of short robust setae on lateral and medial margins; propodus with four groups of short robust setae on lateral margin and a few short setae on medial margin; dactylus with one plumose seta on lateral margin and 2 setae at hinge of nail.

Pereopod 6 (Figs 8D, H): similar to pereopod 5, basis weakly concave on medial margin, lateral margins of merus to propodus with two to four groups of robust setae and fine setae.

Pereopod 7 (Figs 9A, G): basis weakly expanded on medial margin, medial surface with one robust seta on posterodistal corner.

Epimeral plates: epimeral plates 1-3 with five to six short setules on postero-medial margins. Epimeral plate 1 ventrally rounded (Fig. 6L), with seven setae on



FIG. 6. *Gammarus brevipodus* sp. n., holotype, male. A, Head; B, urosomites (dorsal view); C, lower lip; D, upper lip; E, maxilla 2; F, left maxilla 1; G, palp of right maxilla 1; H, left mandible; I, right mandible; J, maxilliped; K, epimeral plate 2; L, epimeral plate 1; M, epimeral plate 3.

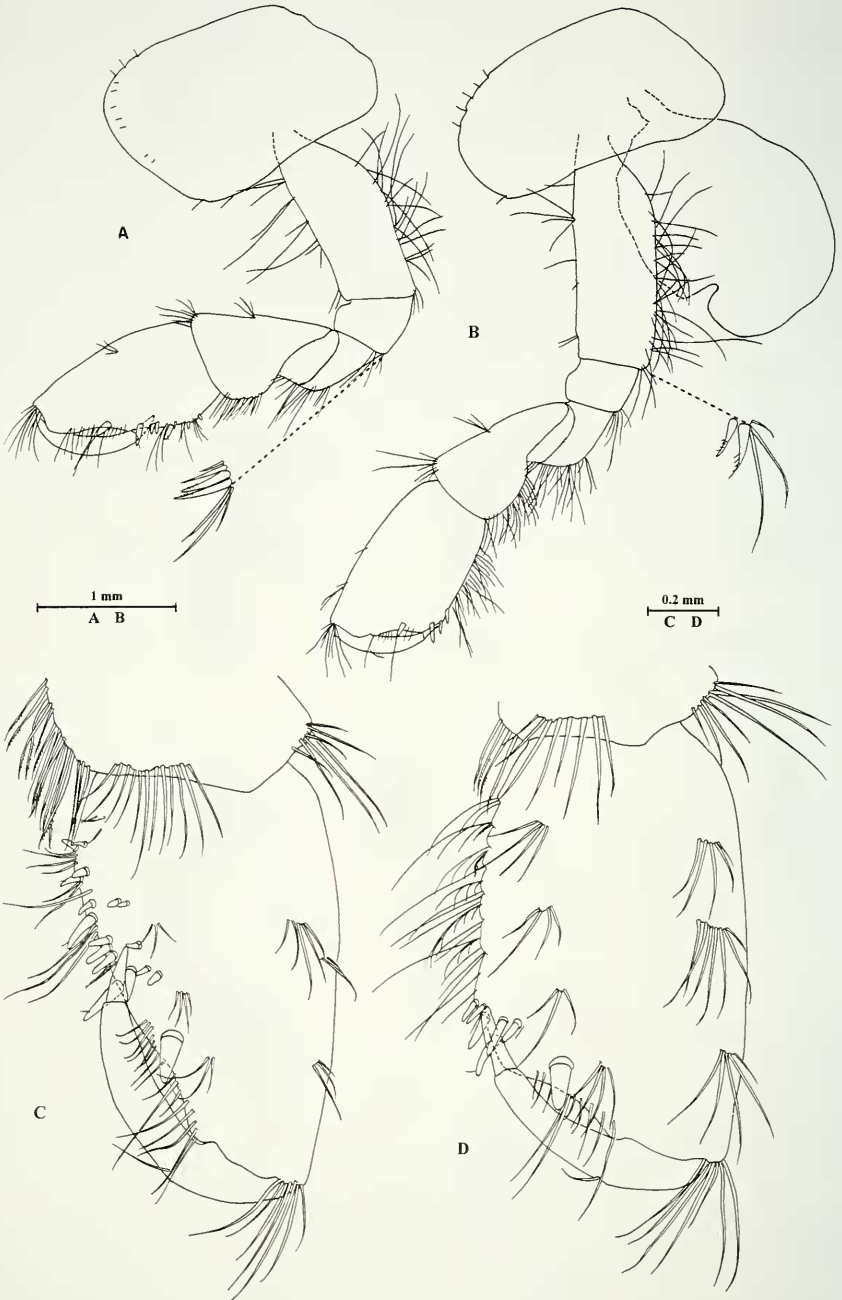


FIG. 7. *Gammarus brevipodus* sp. n., holotype, male. A, gnathopod 1; B, gnathopod 2; C, propodus and dactylus of gnathopod 1; D, propodus and dactylus of gnathopod 2.

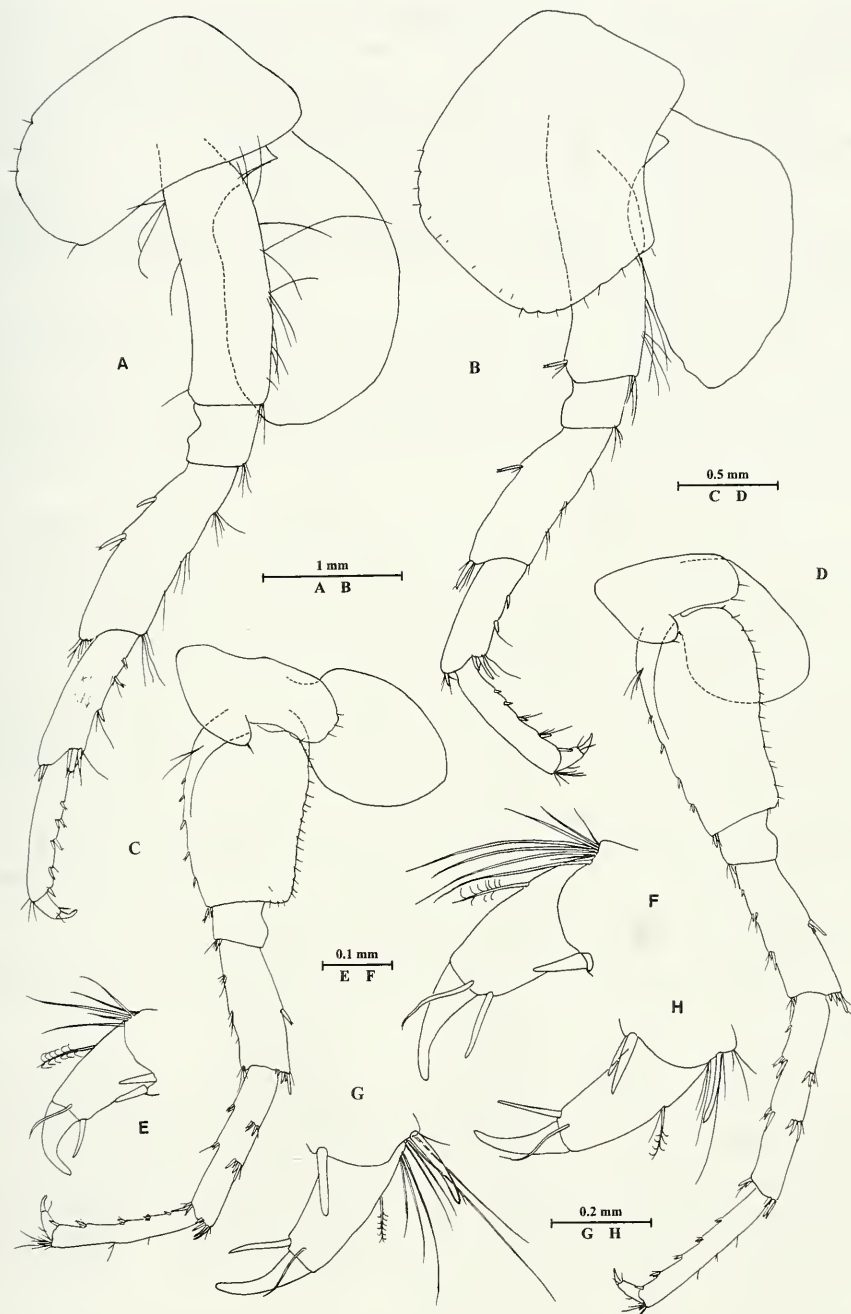


FIG. 8. *Gammarus brevipodus* sp. n., holotype, male. A, pereopod 3; B, pereopod 4; C, pereopod 5; D, pereopod 6; E, dactylus of pereopod 3; F, dactylus of pereopod 4; G, dactylus of pereopod 5; H, dactylus of pereopod 6.

anterior corner; epimeral plate 2 with blunt posterior corner (Fig. 6K), bearing two ventrofacial robust setae; epimeral plate 3 with weakly pointed posterodistal corner (Fig. 6M), bearing one seta and two robust setae on ventrofacial margin.

Pleopods: pleopods 1-3 subequal in length (Figs 9H-J), peduncle with two retinacula accompanied by two setae on anterodistal corners; both rami subequal, twelve to eighteen articulate, armed with long plumose setae.

Urosomites: urosomites 1-3 without humps dorsally, urosomites 1-2 with three groups of robust setae accompanied by fine setae on posterodorsal margins; urosomite 3 with two pairs of robust setae accompanied by fine setae and two fine medial setules on posterodorsal margin (Fig. 6B).

Uropod 1 (Fig. 9L): peduncle longer than rami, with one basofacial robust seta, three robust setae on lateral margin, three robust setae on medial margin, two robust setae on laterodistal corner and one mediiodistal robust seta; inner ramus with two robust setae on medial margin and one robust seta on lateral margin; outer ramus with two robust setae on lateral margin and one robust seta on medial margin; both rami with five distal robust setae.

Uropod 2 (Fig. 9K): peduncle longer than both rami, bearing two robust setae on lateral margin, one robust seta on medial margin, and one robust seta on laterodistal and mediiodistal corners; outer ramus with one robust seta on lateral margin; inner ramus with one robust seta on lateral margin and one robust seta on medial margin.

Uropod 3 (Fig. 10A): peduncle short, bearing a pair of submarginal short robust setae mid-laterally, two robust setae apico-laterally, three robust setae apico-medially, and a pair of slender setules and a single robust seta on the mid-ventrodistal margin; inner ramus short, about one third the length of the outer ramus, bearing medially two robust setae, each with an associated fine seta, and a single small seta distally, without lateral setae, the apex bearing two robust setae, one long and two short fine setae; the outer ramus two articulate, the second article tiny, about one fifteenth the length of the first, and subequal to the six robust apical setae of that article, the second article bearing three fine apical setae; the medial margin of the first article with five transverse rows of mixed robust and fine setae, the lateral margin with five rows.

Telson (Fig. 9B) cleft 75%, each lobe with three robust setae and two or three slender setae on the distal margin of each lobe, only a single facical setule on the left lobe.

*Description of female:* body length 13.8 mm. Gnathopod 1: coxal plate with four setae on anterior corner and three setae on posterior corner; propodus not oblique as in male, with six robust setae on posterior corner (Fig. 10C). Gnathopod 2: carpus about as long as propodus, propodus subrectangular, with one robust seta on posterior corner, nail of dactylus elongate (Fig. 10D). Bases of pereopods 5-7 similar to those of male (Figs 10E-G). Uropod 3 (Fig. 10B): inner ramus less than 30% length of article 1 of outer ramus. Oostegites present on pereopods 2-5 (Fig. 10G).

*Remarks:* *Gammarus brevipedus* sp. n. is similar to *G. balcanicus* Schaferna, 1923 in pereopods 3 and 4 with few setae and the shape of epimeral plates. *Gammarus brevipedus* sp. n. differs from *G. balcanicus* by (1) peduncle of antenna 2 with long setae along both margins and calceoli absent, (2) inner ramus of uropod 3 about one-



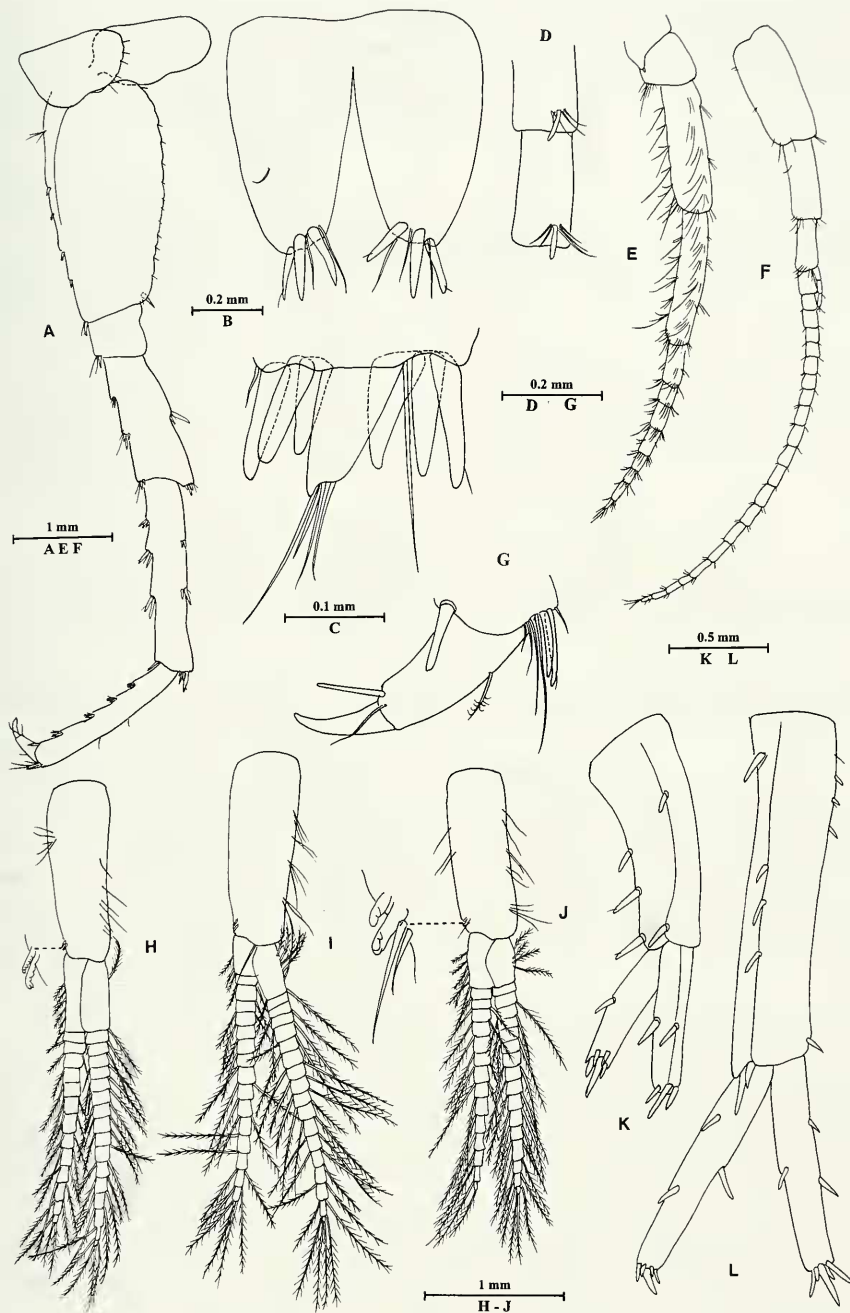


FIG. 9. *Gammarus brevipodus* sp. n., holotype, male. A, pereopod 7; B, telson; C, terminal article of uropod 3; D, flagellum of antenna 1; E, antenna 2; F, antenna 1; G, dactylus of pereopod 7; H, pleopod 1; I, pleopod 2; J, pleopod 3; K, uropod 2; L, uropod 1.

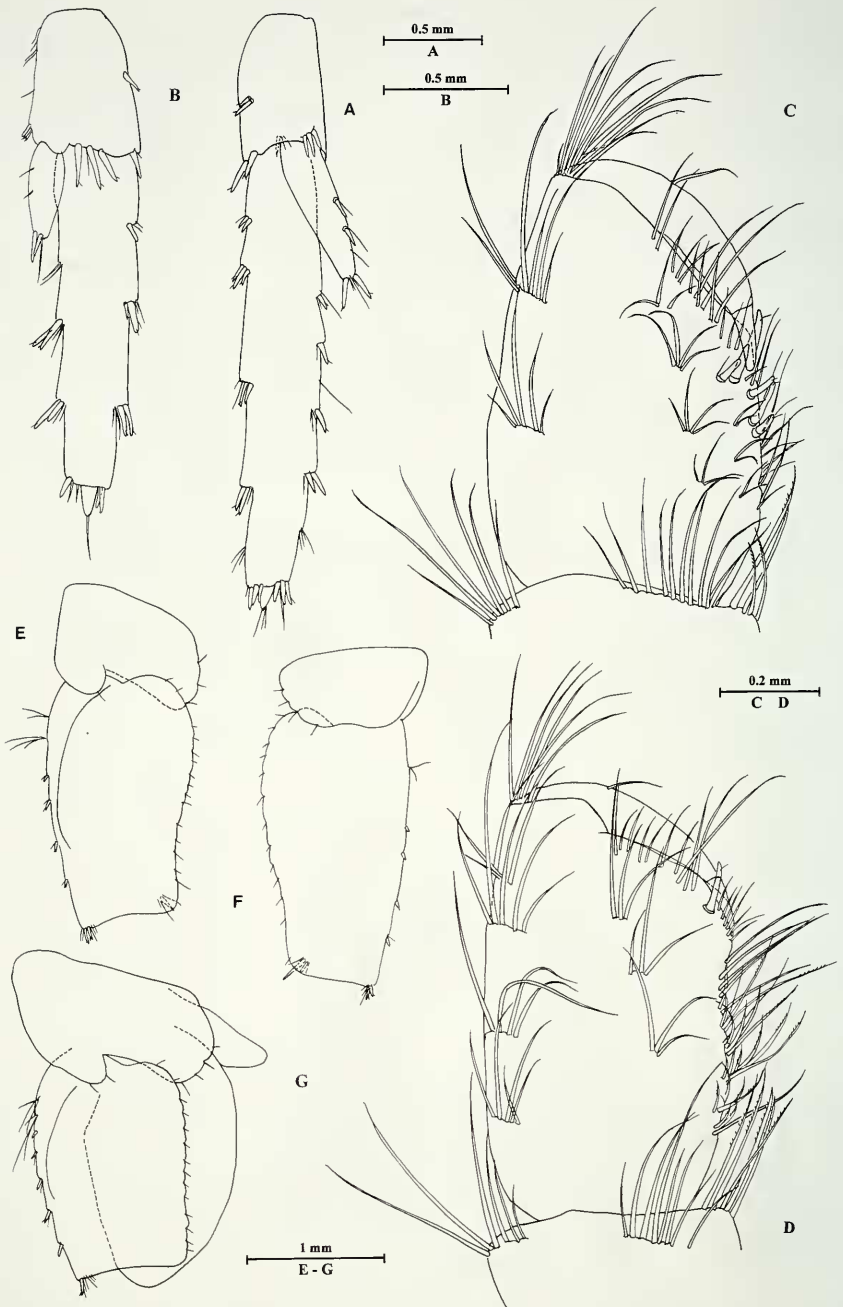


FIG. 10. *Gammarus brevipodus* sp. n., male: A, female: B - G. A, uropod 3; B, uropod 3; C, propodus and dactylus of gnathopod 1; D, propodus and dactylus of gnathopod 2; E, basis of pereopod 6; F, basis of pereopod 7; G, basis of pereopod 5.

third of outer ramus, article 2 of outer ramus of uropod 3 very short, and both rami with few setae in both margins, (3) telson with very few setae on dorsal margin. *G. brevipedus* sp. n. differs from *G. montanus* by pereopods 3 and 4 and uropod 3 with few long setae.

*Gammarus takesensis* sp. n.

Figs 11-15

*Material*: holotype, male (IZCAS-I-A0057), Takes River (a feeder stream of the Ili River) near Takes County (43.13°N, 81.49°E), collected by Dr Zhixiao Liu and Mr Ayiheng, August 11, 2001. Paratypes: 20 males and 10 females (IZCAS), 9 males and 9 females (MHNG), same data as for the holotype.

*Etymology*: the specific name refers to the county of origin.

*Diagnosis*: *Gammarus takesensis* sp. n. belongs to the *G. balcanicus*-group and is characterized by: peduncle of antenna 2 with a few long setae, article 2 of outer ramus of uropod 3 elongate, medial margin of outer ramus and both margins of inner ramus of uropod 3 with short plumose setae, respectively.

*Description of male*: body length 12.5 mm.

Head: inferior antennal sinus deep, eyes medium in size (Fig. 11A).

Antenna 1 (Figs 14B, C): peduncular articles 1-3 in length ratio 1 : 0.65 : 0.37, with some distal fine setae; primary flagellum twenty-eight articulate, most articles with aesthetascs; accessory flagellum four articulate.

Antenna 2 (Figs 14A, D): peduncular article 4 about as long as article 5, both with some short setae along anterior and posterior margins; flagellum twelve articulate, bearing short setae, some articles with calceoli.

Upper lip (Fig. 11C) convex, with minute setules apically.

Mandibles (Figs 11H, I): left incisor with five teeth; lacinia mobilis with four dentitions; molar triturative; article 2 of palp with thirteen long stiff setae on medial margin, article 3 reaching 75% length of article 2, with six A-setae on lateral surface and five long B-setae on medial surface, a row of twenty short plumose D-setae and five long E-setae. Incisor of right mandible with four teeth; lacinia mobilis bifurcate, with weak teeth at ridge; molar with one long seta.

Lower lip: inner lobe absent (Fig. 11E).

Maxilla 1 (Figs 11F, G): inner plate triangular, medial margin bearing several setules basally, and fourteen plumose setae evenly distributed between the base and apex; outer plate subrectangular, the apex bearing eleven serrate robust setae; palp two articulate, the left second article weakly falcate, bearing apically seven robust naked setae and three stiff setules apico-facially; the right second article apically bearing four blunt robust setae and two stiff setae.

Maxilla 2 (Fig. 11D): inner plate bearing a row of thirteen plumose setae on medial surface, evenly distributed between the base and apex; outer plate bearing long stiff setae apically and fine pubescence on lateral margin.

Maxilliped (Fig. 11J): inner plate with one subapical robust seta and three blunt apical robust setae, associated with plumose setae on medial and apical margins; outer plate with seven slender robust setae on medial margin accompanied by short naked setae on medial margin and six pectinate setae apically; palp four articulate.

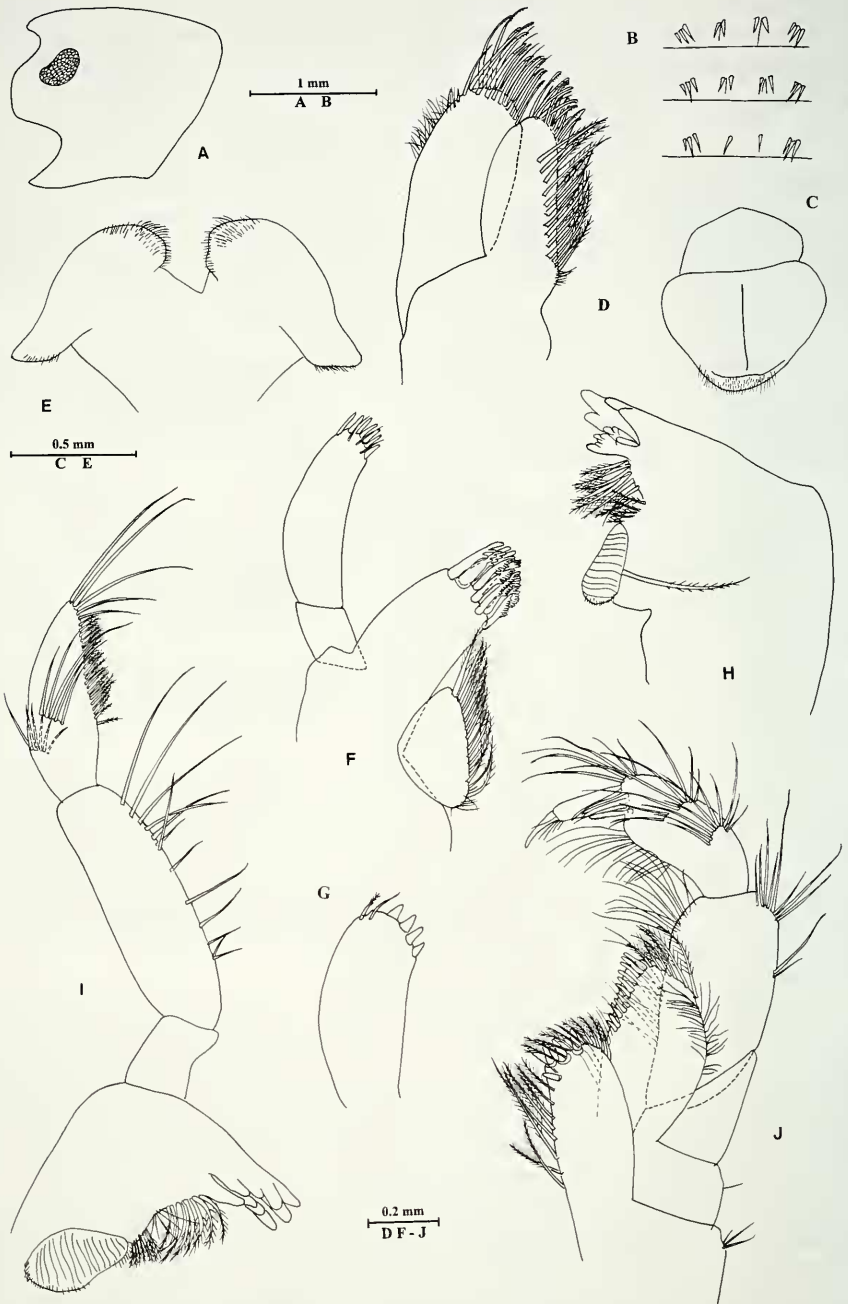


FIG. 11. *Gammarus takesensis* sp. n., holotype, male. A, head; B, urosomites (dorsal view); C, upper lip; D, maxilla 2; E, lower lip; F, left maxilla 1; G, palp of right maxilla 1; H, right mandible; I, left mandible; J, maxilliped.

Coxal plates: coxal plates 1-3 subrectangular (Figs 12A, B, 13B), with two to four setules on anterior corner and one setule on posterior corner; coxal plate 4 excavate (Fig. 13E), with two setules on anterior corner and six setules on medial margin; anterior lobe of coxal plates 5 and 6 (Figs 13C, D) small, with one setule, posterior lobe with one or two setules; coxal plate 7 shallow (Fig. 13F), with three setules on medial margin.

Gnathopod 1 (Figs. 12A, C): basis stout, bearing long setae on lateroproximal and medial margins; carpus reaching 72% length of propodus; palm of propodus oblique, bearing one palmar medial robust seta, five groups of robust setae on lateral margin, three groups of robust setae on medial surface, associated with five to seven groups of setae on medial surface; nail of dactylus short, bearing one naked seta on lateral margin.

Gnathopod 2 (Figs 12B, D): basis similar to that of gnathopod 1; carpus reaching 80% of propodus, with parallel-sided margins, bearing one group setae on lateral margin and many setae on medial margin; propodus subrectangular, bearing one medial palmar robust seta, two robust setae on medial posterodistal corner, two robust setae on lateral posterodistal corner and seven groups of long setae on medial surface; dactylus with one seta on lateral margin.

Pereopod 3 (Figs 13B, G): basis with four groups of long setae on medial margin; merus with one seta and one robust seta accompanied by one seta on lateral margin, and three groups of setae on medial margin; carpus with two pairs of robust setae accompanied by fine setae on medial margin; propodus with three single robust setae and a pair of robust setae on medial margin; dactylus with one plumose seta on lateral margin and two stiff setae at hinge of nail.

Pereopod 4 (Figs 13E, H): subequal to pereopod 3, merus and carpus with less setae on medial margin.

Pereopod 5 (Figs 13C, I): basis nearly straight on medial margin, bearing four single short robust setae on lateral margin and a row of ten short setules on medial margin; merus bearing two single robust setae accompanied by one fine setule on lateral margin, and one short robust seta on medial margin; carpus with a pair of short robust setae on lateral margin and a group of three short robust setae on medial margin; propodus with three pair of short robust setae on lateral margin; dactylus with one plumose seta on lateral margin and two stiff setae at hinge of nail.

Pereopod 6 (Figs 13D, J): similar to pereopod 5 except for basis weakly concave on posterior margin.

Pereopod 7 (Figs 13F, K): similar to pereopod 5, basis slightly expanded on medial margin, bearing two posterodistal setae on medial surface.

Epimeral plates: epimeral plates 1-3 with two or three short setules on postero-medial margins. Epimeral plate 1 ventrally rounded (Fig. 15D), bearing ten setae on anteroventral corner; epimeral plates 2 and 3 with slightly pointed posterior corners (Figs 15E, F), bearing one to two setae and two to four robust setae on ventral margin.

Pleopods: pleopods 1-3 subequal in length (Figs 14H-J), peduncle with some setae on medial surface, bearing two retinacula accompanied by two setae on anterodistal corner; both rami eighteen to twenty articulate, fringed with plumose setae.

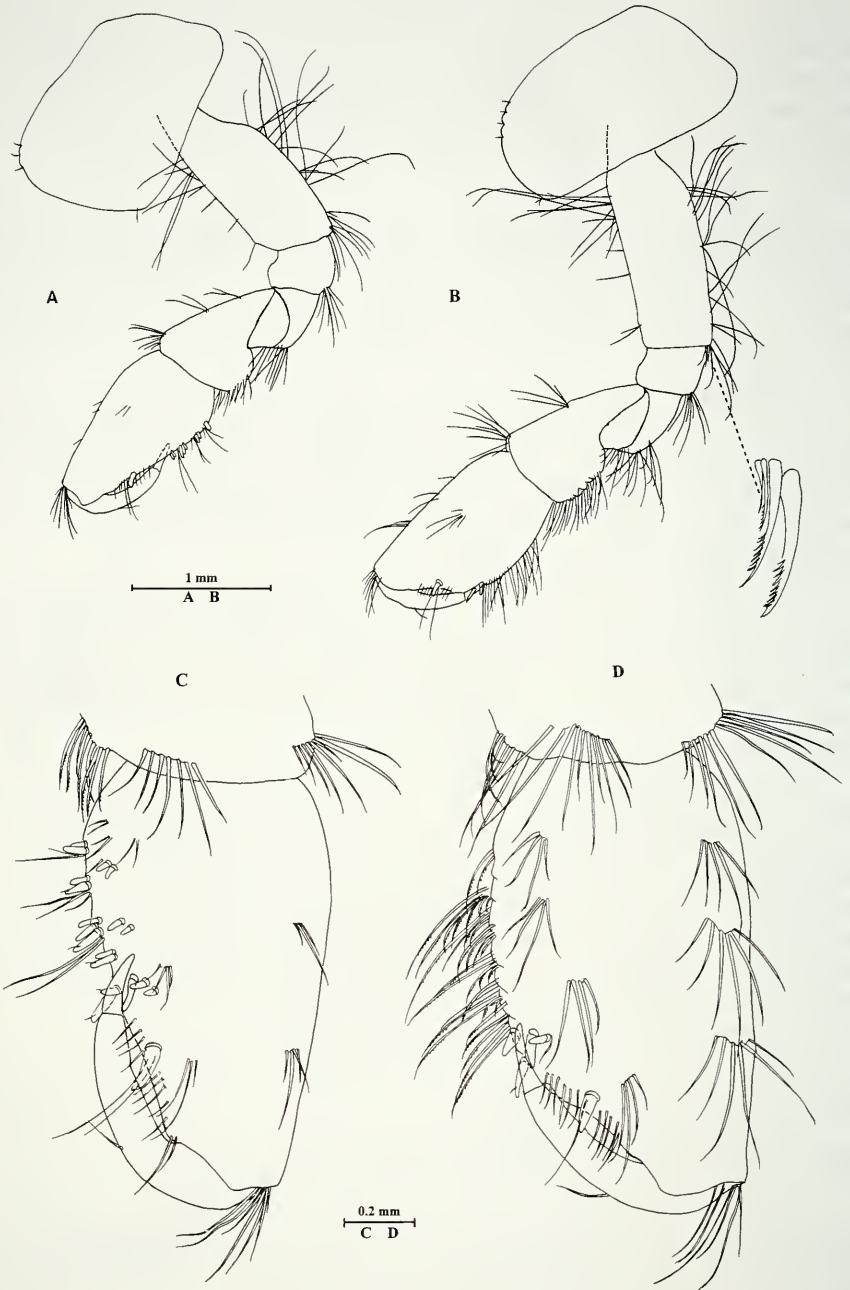


FIG. 12. *Gammarus takesensis* sp. n., holotype, male. A, gnathopod 1; B, gnathopod 2; C, propodus and dactylus of gnathopod 1; D, propodus and dactylus of gnathopod 2.

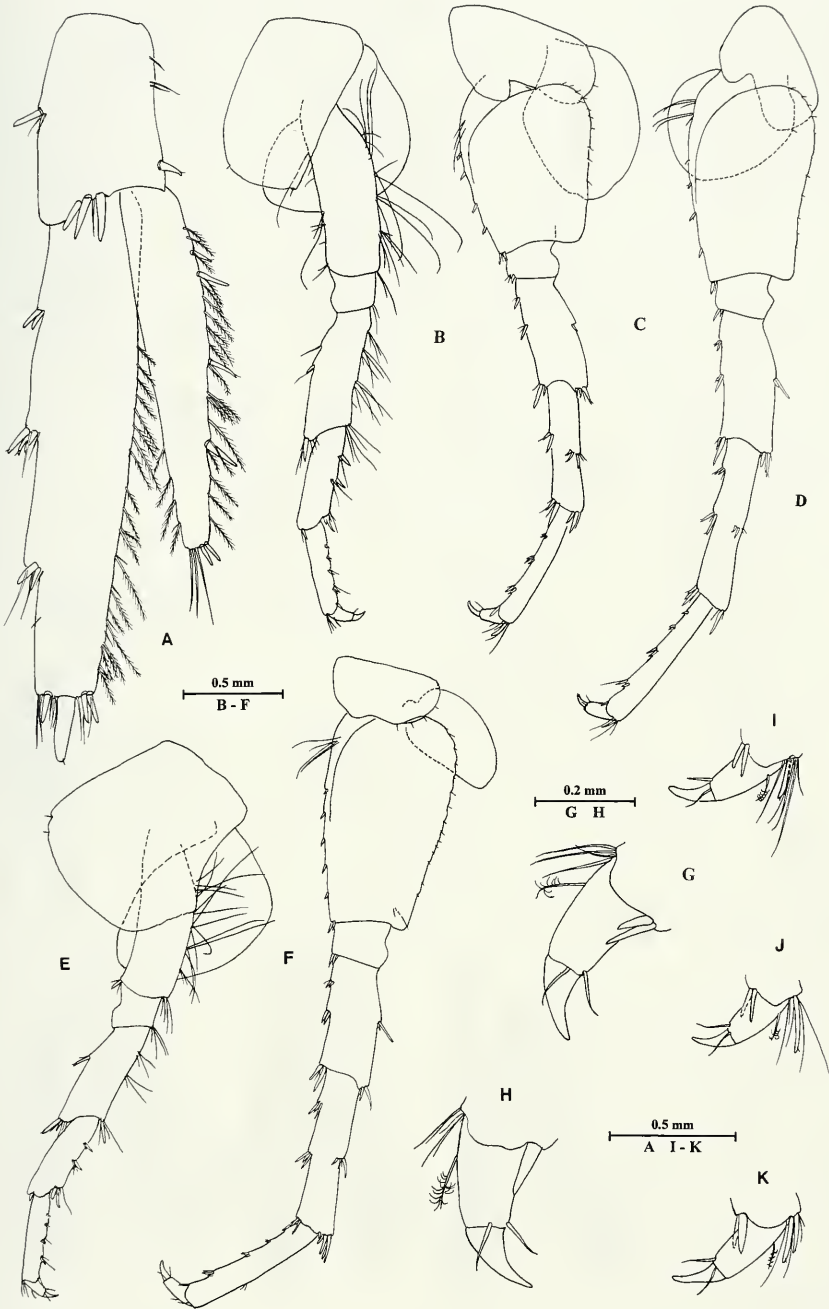


FIG. 13. *Gammarus takesensis* sp. n., holotype, male. A, uropod 3; B, pereopod 3; C, pereopod 5; D, pereopod 6; E, pereopod 4; F, pereopod 7; G, dactylus of pereopod 3; H, dactylus of pereopod 4; I, dactylus of pereopod 5; J, dactylus of pereopod 6; K, dactylus of pereopod 7.

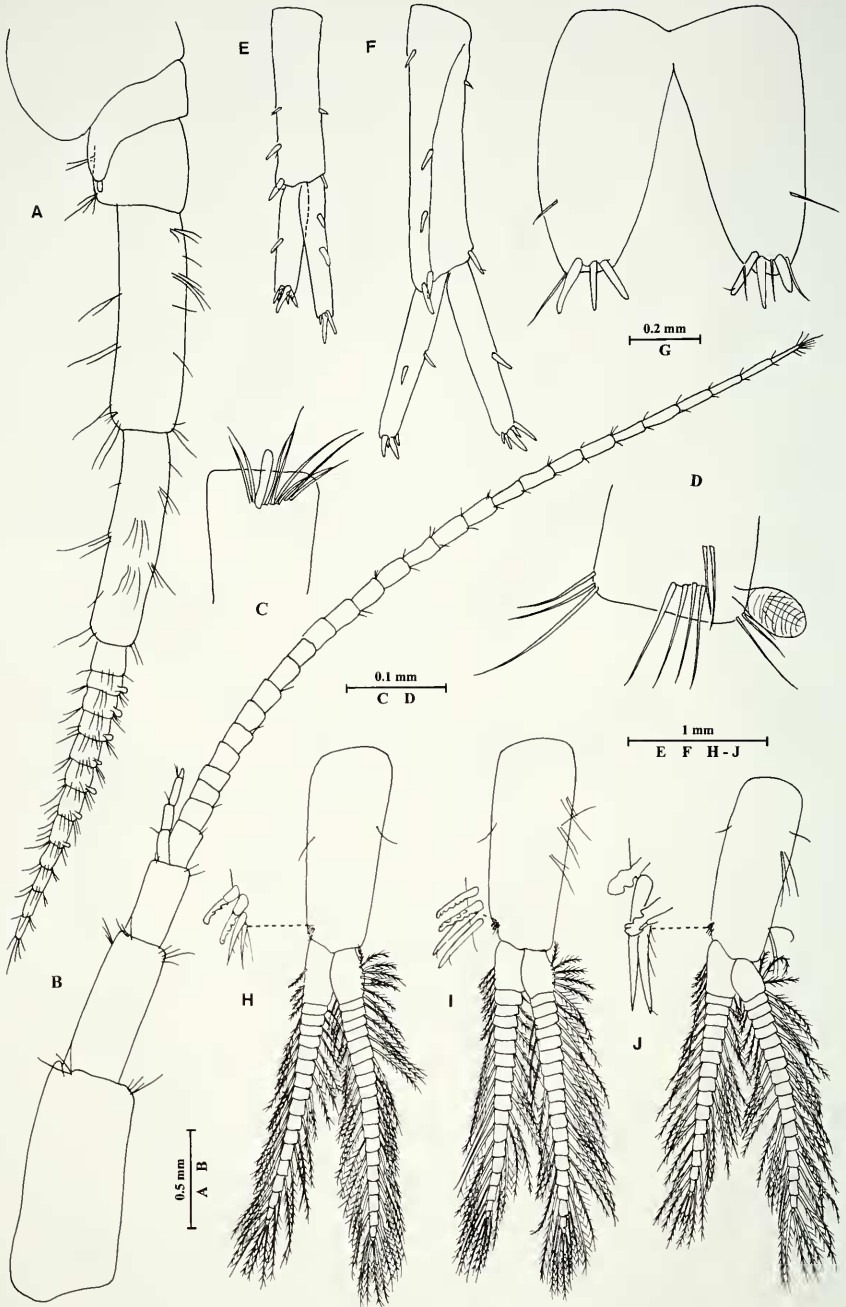


FIG. 14. *Gammarus takesensis* sp. n., holotype, male. A, antenna 2; B, antenna 1; C, flagellum of antenna 1; D, flagellum of antenna 2; E, uropod 2; F, uropod 1; G, telson; H, pleopod 1; I, pleopod 2; J, pleopod 3.



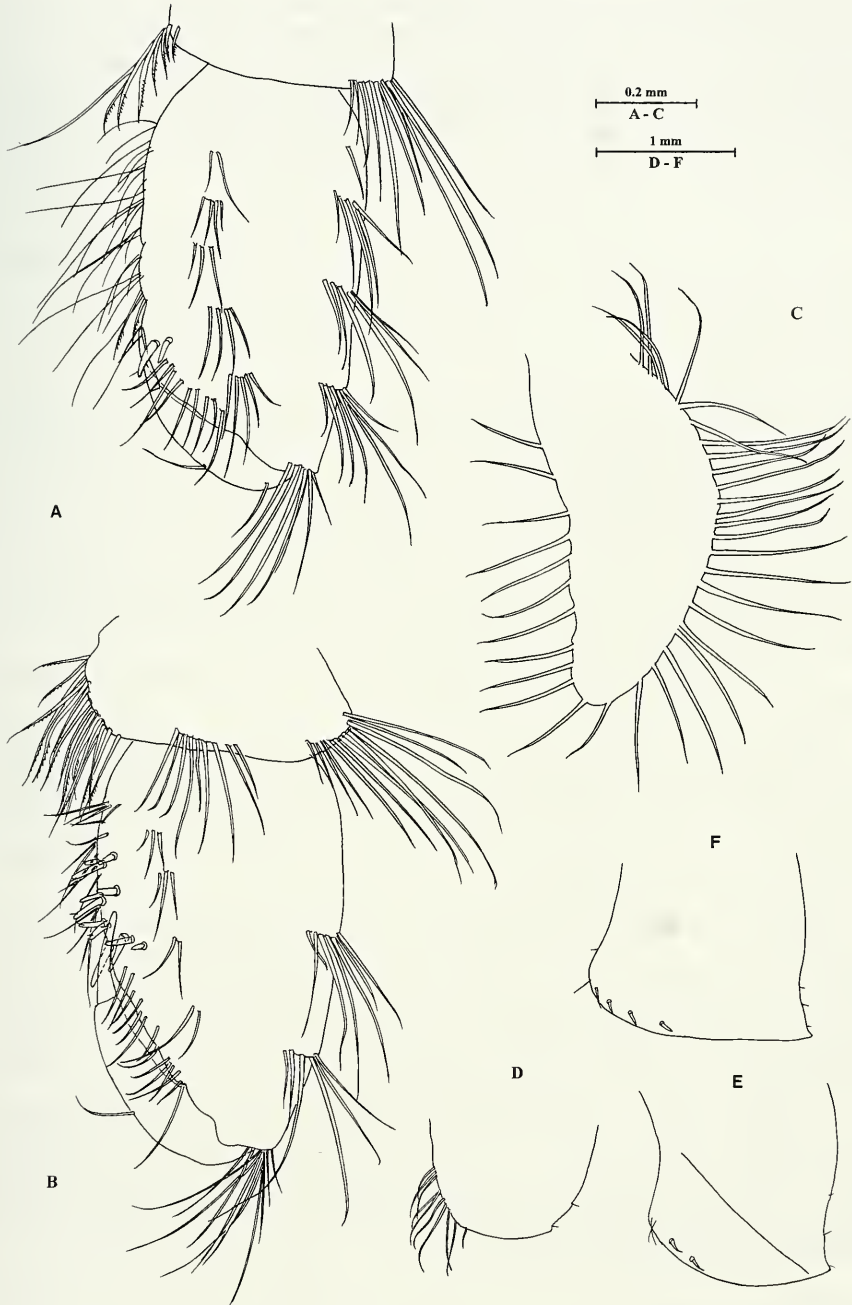


FIG. 15. *Gammarus takesensis* sp. n., female: A - C, male: D - F. A, propodus and dactylus of gnathopod 2; B, propodus and dactylus of gnathopod 1; C, oostegite 2; D, epimeral plate 1; E, epimeral plate 2; F, epimeral plate 3.

Urosomites (Fig. 11B): urosomites 1-3 dorsally flat, bearing four groups of one to three robust setae accompanied by fine setae on posterodorsal margins.

Uropod 1 (Fig. 14F): peduncle longer than both rami, bearing one basofacial robust seta, two robust setae on lateral margin, one short robust seta on medial margin, two robust setae on laterodistal corner and one robust seta on mediiodistal corner; outer ramus with one robust seta on lateral and medial margins; inner ramus with one robust seta on medial margin; both rami with five distal robust setae.

Uropod 2 (Fig. 14E): peduncle longer than both rami, bearing two robust setae on lateral margin, one robust seta on medial margin, and one robust seta on laterodistal and mediiodistal corner; outer ramus shorter than inner ramus, with one robust seta on lateral margin; inner ramus with two robust setae on medial margin; both rami with five distal robust setae.

Uropod 3 (Fig. 13A): peduncle short, bearing a short robust seta mid-laterally, a single robust seta apico-medially, and three robust setae on the mid-ventrodistal margin; inner ramus reaching 74% length of article 1 of outer ramus, bearing medially four robust setae accompanied by a row of short plumose setae, the apex bearing two robust setae and three long naked setae; the outer ramus two articulate, the second article reaching 13% length of first article, and longer than the three robust apical setae of that article, the second article bearing one fine setule apically; the medial margin of the first article with a row of short plumose setae and the lateral margin with three groups of robust setae accompanied by fine setae.

Telson deeply cleft (Fig. 14G), each lobe with three distal robust setae accompanied by one to three long setae, and 1 lateral seta.

*Description of female:* body length 11.2 mm. Propodus of gnathopod 1 (Fig. 15B) so strongly as in the male, bearing twelve robust setae on medial margin; dactylus with one seta on lateral margin, nail elongate. Propodus of gnathopod 2 with only slightly oblique distal margin (Fig. 15A), bearing two robust setae on medial margin. Oostegites of pereopods 2-5 present.

*Remarks:* *Gammarus takesensis* sp. n. is similar to *G. brevipodus* sp. n. in the shape of gnathopods 1 and 2, and in the armature of pereopods 3 and 4 and telson. *G. takesensis* sp. n. differs from the latter by the presence of calceoli, inner ramus of uropod 3 reaching three-fourths of outer ramus, article 2 of outer ramus of uropod 3 longer than adjacent robust setae, and medial margin of outer ramus and both margins of inner ramus of uropod 3 with short plumose setae.

*G. takesensis* sp. n. is also similar to *G. bosniacus* Schaferna, 1923 in pereopods 3 and 4 with few setae, and uropod 3 with some short plumose setae in medial margin of outer ramus. *G. takesensis* sp. n. differs from the latter by accessory flagellum of antenna 1 with four segments, antenna 2 with calceoli, and epimeral plates 2 and 3 without long setae on ventral margins.

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